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**OBSERVATIONS ON THE FEMALE GENERATIVE APPARATUS OF
HYÆNA CROCUTA.**

BY HENRY C. CHAPMAN, M. D.

The Hyæna, as well known, was regarded by many of the ancients as being a hermaphrodite. Thus Aelian¹ observes "if you see a male hyæna one year the next year you will see a female, if now truly a female, afterwards a male, for it partakes of both sexes," while according to Pliny² "the vulgar believe that the hyæna is of both natures and are on alternate years male and female, and bring forth without a male." The same opinion appears also to prevail to a considerable extent even at the present day among the natives and settlers in South Africa. Like many other popular opinions and superstitions the view of the sexes being united in the same individual in the hyæna is based to a certain extent upon fact, as in one species at least, the *Hyæna crocuta*, or spotted hyæna, the male and female individuals resemble each other so closely that naturalists as well as animal dealers and showmen find it impossible, without dissection, to distinguish one sex from the other. Such being the case it might naturally have been supposed that the attention of anatomists would long since have been called to the consideration of the generative apparatus in *Hyæna crocuta*, especially as in the other two species and *Hyæna striata*, *Hyæna brunnea*, the disposition of the generative apparatus is normal. It is only, however, within recent years that it was shown by Prof. Watson of Manchester, England, that in the female of *Hyæna crocuta* the uterus passes directly without an intervening vagina into the urethra to form a uro-genital canal which, perforating the clitoris, offers a passage-way, not only for the urine but also for the foetus. Such a disposition would naturally suggest without dissection the idea of the animal being a hermaphrodite—especially as not only are the vulva and vagina entirely absent, (Plates IX and X), but there are present in addition to the large and well developed clitoris two projections below the anus simulating a condition

¹ Hyaenam si videas uno quidem anno marem altero videbis foeminam, si verò nunc foeminam, postea marem, utrisque enim sexas particeps est. Claudii Aeliani, De Animalium natura. Ludguni, 1616, Lib. I, Cap. xxv.

² Hyænis utraque esse natura et altenus annis mares alteris foemias fieri, parere sine mare vulgus credit. C. Plinii Secundi Naturalis Historiæ. Venetiis 1559, Lib. viii, Cap. xxx.

of the scrotum, obtaining in many of the carnivora. As my dissection of the female generative apparatus of *Hyæna crocuta* that recently died at the Philadelphia Zoological Garden agrees in every respect¹ with that of Prof. Watson, and as the description of the parts given by that anatomist is excellent, my dwelling further upon the same in detail apart from confirmation, would be superfluous. I will limit myself therefore, rather to the consideration of how such an extraordinary disposition of generative apparatus might be brought about and to pointing out its significance in the determination of the homologous parts of the male and female generative organs of the mammalia generally. It is well known that at an extremely early period of intra-uterine life, about six weeks, for example, in the case of the human embryo, (Plate XI, fig. 2.) the sex is undistinguishable, ovaries or testicles are undeveloped, the Mullerian and Wolffian ducts, bladder and rectum terminate in a common receptacle or cloaca, while no external generative organs are observable. As the development of the mammal advances, however, the rectum and bladder separate and open by distinct openings, the anus and urethra, the cloacal condition being retained through life only in *Ornithorynchus* and *Echidna*, the Wolffian ducts become the vasa deferentia, the Mullerian ducts atrophying, supposing the individual to become a male or the Wolffian ducts atrophying and the Mullerian ducts become transformed into Fallopian tubes, uterus and vagina, supposing the individual to become a female, the two bodies up to this moment, indifferent functionally, becoming testicles or ovaries respectively—the testicles usually in time descending into a scrotum, the urethra passing through the penis. It is well known that in the female of certain shrews, moles and lemurs and, as recently observed by the author in the South American hare, *Capromys pilorides*, (Plate XI, fig. 1.) the urethra passes through the clitoris as through the penis in the male of these animals. The fact of the clitoris being traversed by the urethra in the of female *Hyæna crocuta* is, therefore, not such an uncommon condition as at first sight it might appear and confirms the view held by morphologists of the clitoris being the homologue of the penis. Indeed the clitoris only differs from the penis in being smaller and in the fact that the labia minora do not unite underneath the urethra in the middle line to form what would correspond

¹ It need hardly be mentioned that the contracted kidney and dilated ureter, the latter due to impacted calculi, observable in my dissection, are pathological conditions.

to the skin on the under surface of the penis. It has already been mentioned that an early stage in the development of the mammalian embryo the rectum, bladder, Mullerian ducts (the latter in the female becoming the vagina and uterus) pass into the cloaca, and that as development advances the rectum separates from the cloaca, opening by the anus. With a still further advance in development the uterus separates from the uro-genital canal and opens by a distinct canal, the vagina, the bladder opening through the urethra. While such is the normal order of development of the female generative apparatus in the mammalia, it may be readily conceived that, should the development be arrested at the stage in which the uterus and the bladder still pass together into a uro-genital sinus and should the latter traverse the clitoris in the same manner as the urethra does in the case of *Capromys* etc., a disposition precisely similar to that found by Prof. Watson and the author, in the female of *Hyæna crocuta* would result. If the above view be admitted, then the peculiar arrangement of the female generative apparatus in *Hyæna crocuta* may be regarded as due to an arrest of development. One of the most remarkable peculiarities of the female generative apparatus of *Hyæna crocuta*, to which we have hitherto only incidentally alluded, is the entire absence of a vagina, the uterus passing directly into the urogenital canal in which respect the animal differs from all other mammalia, except perhaps the elephant. In the latter animal in both the Indian and African species, as observed by the author¹ a long and capacious urogenital canal leads into the bladder on the one hand and on the other into a cavity which the author regarded either as corresponding to a vagina or to the neck of the uterus, this cavity leading in turn into the body of the uterus. Should the latter view be accepted, that is if the cavity in question be regarded morphologically as uterine, then the vagina would be absent in the elephant, as it is without doubt in the hyæna. In conclusion it may be mentioned that the fact of the vagina being undoubtedly absent in *Hyæna crocuta* and probably also in the elephant settles definitely, at least for these animals, the question as to whether the utriculus or sinus pocularis of the male should be regarded as the homologue of the uterus or the vagina of the female, since if the vagina be absent in the female hyæna and elephant the utriculus of the male of these animals must necessarily be homologous with the uterus of the female.

¹ On the Placenta and female generative apparatus of the Elephant. Journal of Acad. of Nat. Sci. of Philad., n. s. VIII p. 413.

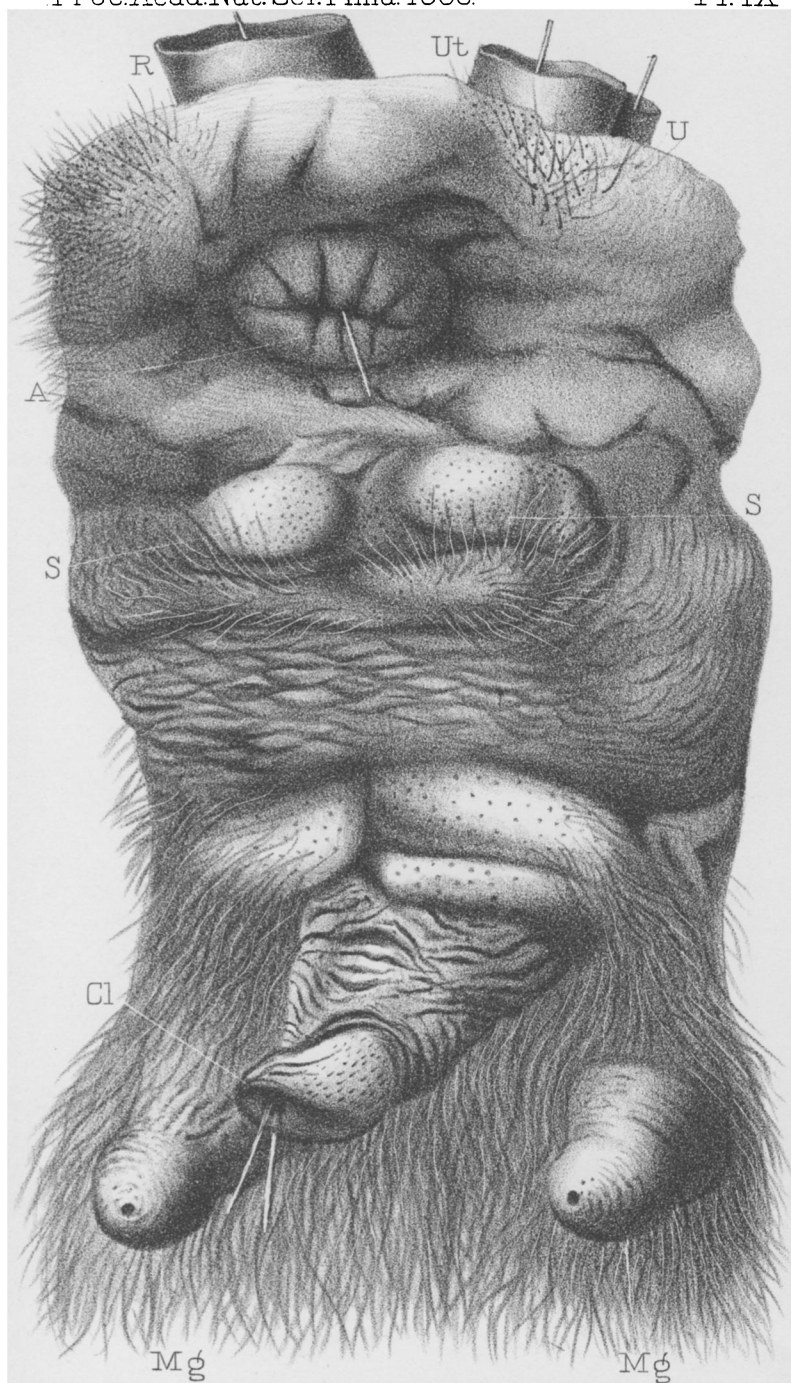
EXPLANATION OF PLATES IX, X, XI.

The lettering is the same on all the figures.

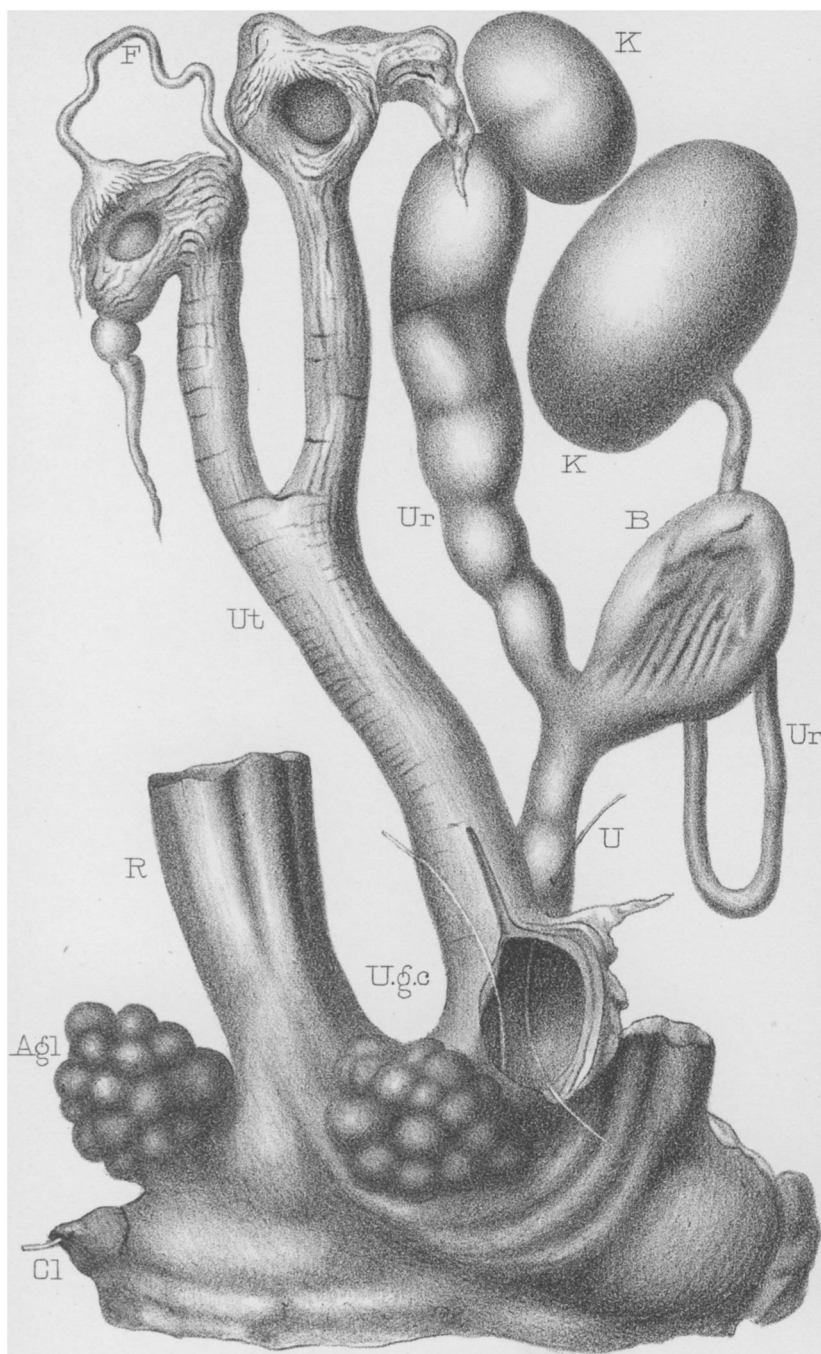
A.	Anus.
Agl.	Anal Glands.
B.	Bladder.
Cl.	Clitoris.
F.	Fallopian Tube.
k.	Kidney.
m.	Müllerian Ducts.
MG.	Mammary Glands.
o.	Ovary.
R.	Rectum.
S.	Scrotal Pouches.
Sr.	Supra-renal Capsules.
t.	Testicle.
U.	Urethra.
Ugc.	Urogenital Canal.
Ur.	Ureter.
Ut.	Uterus.
V.	Vagina.
W.	Wollfian Ducts.

Corrections. Page 189, line 19, omit "and."

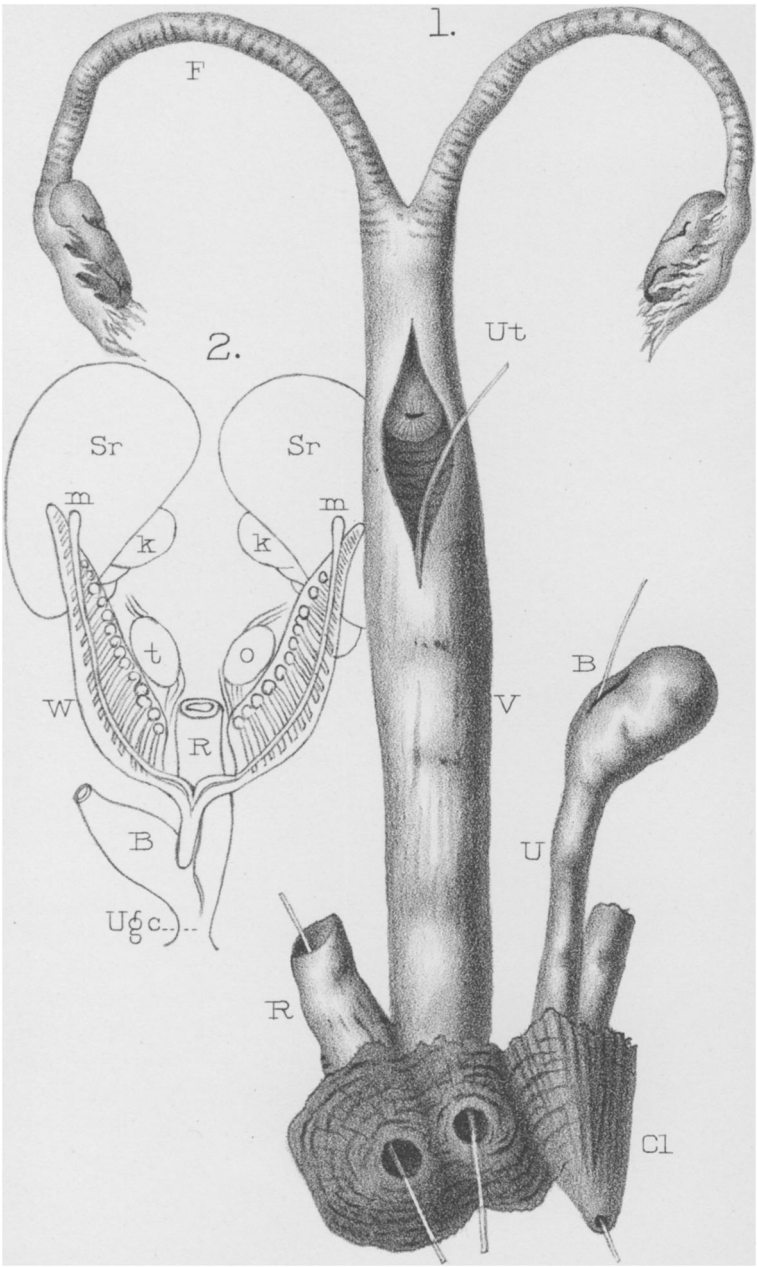
Note, line 3 from bottom for "altenus" read "alternis,"
for "alteris" read "alternis," for "foemias" read "foe-
minas."



Chapman on Hyaena &c.



Chapman on Hyaena &c. .



Chapman on Hyaena &c.